

Our energy working for you.™



Power topic #9009 | Technical information from Cummins Power Generation

EPA emission regulations

The transition to ultra-low sulfur diesel

White Paper

By Cummins Power Generation, PowerCare program

Beginning in 2006, the Environmental Protection Agency (EPA) began an ambitious program to reduce the sulfur content of diesel fuels. As of July 11, 2010, the EPA will require that the concentration of sulfur present in diesel fuel for off-road engines not exceed 15 ppm. This paper explains how the Environmental Protection Agency's (EPA) ultra-low sulfur emissions standards apply to diesel engines used in generator sets.

The regulatory landscape

Prior to 2006, stationary diesel engines, which are primarily used for power generation, were not regulated at a federal level. Emissions regulations for stationary engines were usually governed by state and local permitting authorities and varied by the annual operating hours for the application. This was in contrast to other non-road diesel engines.

The EPA's Clean Air Non-road Diesel rule recognizes stationary engines as non-road engines. Stationary engines are defined as

any engine that is permanently installed or located on site for a minimum period of 12 months. This category includes standby generator sets, on-site prime and distributed energy power systems, and a wide variety of industrial engines mounted on permanent bases or foundations.

As a result, diesel generator sets providing standby and emergency power, distributed generation and utility peaking are now subject to the same regulations governing farm and construction equipment. The new ultra-low sulfur mandate will reduce by 97% (from 500 ppm in low sulfur fuel) the amount of sulfur present in diesel fuels for non-road engines.

Impact on lubricity and fuel stability

The transition to ultra-low sulfur fuels has the potential to result in decreased lubricity. This is because the refinery process necessary to extract sulfur also extracts nitrogen, oxygen, aromatics and other lubricity agents in diesel fuel. Loss of lubricity can result in deterioration and damage to the engine.

It is worth noting, however, that fuel providers have been reintroducing lubricity agents into fuel in a response to tightening fuel standards. As such, we can safely anticipate no further loss of lubricity as a result of the new EPA standards.

Further, the transition to ultra-low sulfur fuels has one potentially beneficial impact on fuel stability. The process of extracting sulfur reduces the amount of inorganic sediment present in the fuel. This inhibits the formation of soluble gums that can clog fuel filters.

Impact on microbial growth

The presence of bacteria in diesel fuel is the leading cause of engine breakdown. Bacteria and fungi will form insoluble particulate matter that can clog fuel filters, resulting in fuel starving and engine stoppage. They can also corrode metal surfaces, including storage tanks and pumps, and will form organic acids that contribute to fuel instability.

Reducing the amount of sulfur in diesel fuel renders the fuel vulnerable to microbial growth. In addition to removing oxygen and nitrogen, the process for removing sulfur from fuel requires introducing water. When fuel becomes contaminated, the water in diesel fuel becomes a breeding ground for bacteria and fungus.

Emergency and standby generator sets are at the greatest risk for bacterial contamination and freezing, as they often go through extended intervals of disuse. Without proper maintenance, sitting water can become a veritable Petri dish in your fuel tank.

Water temperature and freezing

In particularly cold climates, the introduction of water will allow ice to form as diesel fuel is being stored. Ice formation will clog the fuel line and filters. Again, standby and emergency power generators are at greatest risk.

Fuel Cetane

Fuel Cetane is a fuel component that impacts the burning process. Low cetane fuels can be the major cause of excessive smoke at initial start up. Ultra low sulfur fuels still must maintain a minimum cetane rating of 40 and, under colder weather conditions, even higher. There are additives available that can be added to fuel not meeting these minimum recommendations. Please consult with your fuel supplier to assure they are meeting these minimum standards.

Control strategies

Begin with quality fuel: It stands to reason that tainted or improperly treated fuel will result in poor output. After treatment options, such as the application of biocides, become exponentially more costly and difficult once bacteria are present.

It is important to select a fuel provider that employs proper storage and delivery methods. It is also important to select a provider that utilizes a proper balance of additives. Additives, including biocides, lubricity agents, and stabilizers, are all key components to diesel fuel. Also, be sure to select fuel that is climate appropriate for your generator set.

Fortunately, EPA on-road emissions standards are already in place. Fuel providers have had months or years to research the most effective blend of fuel additives.

Testing and maintenance: Since added water is the main culprit in bacterial growth and line freezing, it is crucial to establish a regular maintenance program that includes regular testing. Testing and (if necessary) treatment will go a long way toward preserving the life your generator set.

Water should be checked and removed on a regular basis. Consult with your fuel maintenance company to determine the best program for your conditions.

It is important to establish a monitoring program, taking samples of your fuel at regular intervals. This allows you to check for bacteria, fungi and sediment. A good maintenance program is vital for the transition to biodiesel, which introduces any number of performance inhibitors, some of which are entirely unexpected.

For generator sets with long idle periods (as is the case with backup and emergency power), regular fuel polishing is essential for long term performance. Again, this is part of a regular maintenance plan that can improve the life of your generator set.

After-treatment: The application of biocides is crucial to the quality of your fuel and the life of your generator set. Regular maintenance will reveal the presence (or lack) of bacteria and fungi. Fungicides and biocides are effective at killing fungi and bacteria, respectively.



Our energy working for you.™
www.cumminspower.com

©2010 Cummins Power Generation



About us

Cummins Power Generation is a global supplier of Power Generation equipment, solutions and services. Generator services include planned maintenance, diagnostics, repair, and 24/7 emergency support. For large, national fleet customers the PowerCare program is designed

to provide an extra level of quality and simplicity through our centralized, factory-based service support team.

If testing reveals no fungi or bacteria present, a treatment level of fungicide or biocide will be necessary. If they are present, a more extensive treatment, known as a “kill dose”, will be needed. The latter treatment is expensive and time consuming. Worse, killing fungi can lead to a buildup of dead matter, which can also block filters and even cause fuel to oxidize.

Conclusion

While the transition to ultra-low sulfur diesel presents some new obstacles, each is manageable with a reliable program to test and maintain your fuel supply. Establishing a regular maintenance program will facilitate compliance with all applicable codes, while extending the life of your generator set, and preventing future complications down the (off) road.

For technical support and information about our fuel management solutions, please contact your local Cummins Power Generation distributor. To locate your distributor, visit www.cumminspower.com.

For more information about the PowerCare Program visit www.cumminspowercare.com or email powercare@cummins.com.



Our energy working for you.™
www.cumminspower.com

©2010 Cummins Power Generation Inc.
All rights reserved. Cummins Power Generation and Cummins are registered trademarks of Cummins Inc. “Our energy working for you.” is a trademark of Cummins Power Generation.
PT-9009 (04/10)